WHAT IS CLAIMED IS:

1. A print control unit comprising:

a position detecting part to detect a position and a transfer direction of an object to be controlled and driven by a motor;

a speed detecting part to detect at least a physical value that corresponds to a speed of the object;

a first control part to decide a current value to be supplied to the motor so that the speed of the object reaches a target speed, based on the output of the position detecting part and at least one of control parameters, thus controlling the motor based on the current value decided by the first control part;

a second control part to decide a current value to be supplied to the motor so that the speed of the object reaches the target speed, based on the outputs of the position detecting part and the speed detecting part, and at least one of the control parameters, thus controlling the motor based on the current value decided by the second control part;

a third control part to decide a current value to be supplied to the motor so that the object stops within a predetermined range, based on the output of the position detecting part and at least one of the control parameters, thus controlling the motor based on the decided current value; and

a selection control part, operating at a predetermined timing, to select and set the control parameters in accordance with the target speed, to judge as to whether the object is located within a target range, based on the output of the position detecting part, if located, the selection control part selecting and operating the third control part, while if the object is not located within the target range, the selection control part selecting and operating the first or the second control part based on the physical value corresponding to the speed.

2. A print control unit, as set forth in claim 1, further comprising a differential speed control part, operating when the first or the second control part is selected, to calculate speeds

of the object based on the output of the speed detecting part for obtaining speed deviations of the speeds of the object at operations from a reference speed, to calculate a current value that is proportional to the difference between the speed deviation at the present operation and the speed deviation at a previous operation, thus controlling the motor based on addition of the calculated current value and the output of the selected control part.

3. A print control unit, as set forth in claim 1, wherein the object to be controlled is a carriage, the motor is a carriage motor for driving the carriage, and the position detecting part includes a counter that detects leading and trailing edges of output pulses of an encoder that generates the pulses according to rotation of the carriage motor, counts up the detected edges when the carriage motor is rotating in a normal direction, while counts down the detected edges when the carriage motor is rotating in the reverse direction, the position detecting part generating pulses in synchronism with the leading and trailing edges.

4. A print control unit, as set forth in claim 3, wherein the selection control part includes a timer counter, having a set value in accordance with the target speed of the carriage, whose counted value is reset when the counted value reaches the set value or when the timer counter receives the pulses from the position detecting part, and, when the carriage is not located within the target range, the selection control part selects the first control part when receiving no pulses from the position detecting part even the counted value of the timer counter has reached the set value, while selects the second control part when receiving the pulses from the position detecting part before the counted value of the timer counter reaches the set value.

5. A print control unit, as set forth in claim 4, wherein when the first control part is selected by the selection control part, and when the position of the carriage is not located beyond the target position, the first control part adds an incremental or

a decremental current value selected among the control parameters according to the target speed to a current value that is now being supplied to the carriage motor, thus controlling the carriage motor based on the addition result, when the position of the carriage is located beyond the target position and also the target range, the first control part subtracts the incremental or the decremental current value from the current value that is now being supplied to the carriage motor, thus controlling the carriage motor based on the subtraction result, and when the position of the carriage is located within the target range, the first control part subtracts a current value corresponding to friction load that is one of the control parameters from the current value being supplied to the carriage motor in a direction that is the reverse of a direction in which a current value is supplied to the carriage motor while the carriage is moving, thus controlling the carriage motor based on the subtraction result.

6. A print control unit, as set forth in claim 4, wherein when the second control part is selected by the selection control part, or when the position of the carriage is not located beyond the target position or the position of the carriage is located beyond the target position and the target range, the second control part compares the output of the speed detecting part and a threshold value among the control parameters to select an incremental or a decremental current value among the control parameters, to calculate a current value to be supplied to the carriage motor so that the speed of the carriage reaches the target speed based on the selected incremental or decremental current value and a current value that is now being supplied to the carriage motor, thus controlling the carriage motor based on the calculated current value, while when the position of the carriage is located within the target range, the second control part subtracts a current value corresponding to friction load from the current value supplied to the carriage motor in a direction that is the reverse of a direction in which a current value is being supplied to the carriage motor while the carriage is moving.

7. A print control unit, as set forth in claim 6, wherein the speed detecting part includes a time measuring part that detects the leading and trailing edges of the output pulses of the encoder and measures a period between the edges, the speed detecting part outputting the measuring result.

8. A print control unit, as set forth in claim 7, further including a differential speed control part, operating while the first or the second control part has been selected, to calculate speeds of the object based on the output of the speed detecting part to obtain speed deviations of the speeds of the object at operations from a reference speed, to calculate a current value that is proportional to the difference between the speed deviation at the present operation and the speed deviation at a previous operation, thus controlling the motor based on addition of the calculated current value and the output of the selected control part.

9. A print control unit, as set forth in claim 4, wherein when the third control part is selected by the selection control part, the third control part judges as to whether the position of the carriage is located within a predetermined allowable range including the target range, if located, to set the current value to be supplied to the carriage motor at zero for controlling the carriage motor, while if not located within the allowable range, to operate the first or the second control part via the selection control part.

10. A print control unit, as set forth in claim 3, wherein when an absolute value of the current value to be supplied to the carriage motor exceeds an allowable value, the carriage is stopped for short brake operation of the carriage motor.

11. A print control unit, as set forth in claim 3, wherein, based on the output of the position detecting part, while the carriage is approaching a predetermined position towards the target range, the predetermined position being located outside

the target range and being apart from one of terminals of the target range by a predetermined distance, the selection control part selects and sets at least one of the control parameters so that the target speed of the carriage reaches a first value, and when the carriage passes the predetermined position, the selection control part selects and sets at least one of the control parameters so that the target speed reaches a second value that is smaller than the first value.

12. A print control method used for a print control unit including

a position counter having a counter that detects leading and trailing edges of output pulses of an encoder that is transferred with a carriage driven by a carriage motor, and counts up the detected edges while the carriage motor is rotating in a normal direction, on the other hand, counts down the detected edges while the carriage motor is rotating in a reverse direction, thus the position counter generating pulses in synchronism with the leading and trailing edges; a period counter to detect the leading and trailing edges of the output pulses of the encoder, and measure a period between the edges; and a timer counter having a set value corresponding to the target speed of the carriage, a counted value of the timer counter being reset when the counted value has reached a set value or when the timer counter receives the pulses from the position counter, the method comprising the steps of:

supplying an initial current value to the carriage motor;

comparing the counted value of the position counter and the target position of the carriage when the timer counter receives the pulses from the position counter or when the counted value of the timer counter reaches the set value;

performing hold control so that the carriage is stopped within an allowable range including a target range based on the output of the position counter and at least one of control parameters when the position of the carriage is located within the target range including the target position;

performing timer interruption control so that a speed of the carriage reaches the target speed based on the output of the

position counter and the control parameter when the position of the carriage is not located within the target range and when the timer counter receives no pulses from the position counter even the counted value of the timer counter has reached the set value; and

performing encoder interruption control so that the speed of the carriage reaches the target speed based on the outputs of the position counter and the period counter and also the control parameter when the position of the carriage is not located within the target range and when the timer counter receives pulses from the position counter until the counted value of the timer counter reaches set value.

13. A print control method, as set forth in claim 12, wherein the step of performing timer interruption control includes the steps of:

when the position of the carriage is not located beyond the target position, adding an incremental or a decremental current value selected among the control parameters based on the target speed to a current value that is now being supplied to the carriage motor, thus controlling the carriage motor based on the addition result;

when the position of the carriage is located beyond the target position and the target range, subtracting the incremental or decremental current value from the current value that is now being supplied to the carriage motor, thus controlling the carriage motor based on the subtraction result; and

when the position of the carriage is located within the targe range, subtracting a current value corresponding to friction load that is one of the control parameters from the current value supplied to the carriage motor in a direction that is the reverse of a direction in which a current value is supplied to the carriage motor while the carriage is moving, thus controlling the carriage motor based on the subtraction result.

14. A print control method, as set forth in claim 12, wherein the step of performing encoder interruption control includes the

steps of:

when the position of the carriage is not located beyond the target position or the position of the carriage is located beyond the target position and the target range, comparing output of the period counter and a threshold value among the control parameters to select an incremental or a decremental current value among the control parameters based on the comparison result, to calculate a current value to be supplied to the carriage motor so that the speed of the carriage reaches the target speed based on the selected incremental or decremental current value and the current value that is now being supplied to the carriage motor, thus controlling the carriage motor based on the calculated current value; and

when the position of the carriage is located within the target range, subtracting a current value corresponding to friction load from the current value supplied to the carriage motor in a direction that is the reverse of a direction in which a current value is supplied to the carriage motor while the carriage is moving, thus controlling the carriage motor based on the subtraction result.

15. A print control method, as set forth in claim 12, wherein the step of performing hold control includes the step of judging as to whether the position of the carriage is located in a predetermined allowable range including the target range, if located, to set the current value to be supplied to the carriage motor at zero for controlling the carriage motor, while if not located, to perform the timer interruption control or the encoder interruption control.

16. A computer-readable storage medium storing control program code for controlling a print control unit, comprising:

first program code means for supplying an initial current value to a carriage motor for driving a carriage;

second program code means for comparing a counted value of a position counter and a target position of the carriage when a timer counter receives pulses from the position counter or when

the counted value of the timer counter reaches the set value;

third program code means for performing hold control so that the carriage is stopped within an allowable range including a target range based on the output of the position counter and at least one of control parameters when the position of the carriage is located within the target range including the target position;

forth program code means for performing timer interruption control so that a speed of the carriage reaches the target speed based on the output of the position counter and the control parameter when the position of the carriage is not located within the target range and when the timer counter receives no pulses from the position counter even the counted value of the timer counter has reached the set value; and

fifth program code means for performing encoder interruption control so that the speed of the carriage reaches the target speed based on the outputs of the position counter and the period counter and also the control parameter when the position of the carriage is not located within the target range and when the timer counter receives pulses from the position counter until the counted value of the timer counter reaches set value.